CLAIMS:

What is claimed is:

1. A method of processing a layer containing a high-permittivity material in a plasma processing system, the method comprising:

providing a layer containing a high-permittivity material overlying a substrate;

modifying the layer containing the high-permittivity material by exposing the layer to a plasma; and

wet etching to remove the modified layer containing the high-permittivity material.

2. The method as claimed in claim 1, wherein the modifying partially removes the layer containing the high-permittivity material.

3. The method as claimed in claim 1, wherein the modifying partially disassociates the layer containing the high-permittivity material.

4. The method according to claim 1, wherein the modifying comprises introducing a process gas into a plasma chamber and creating the plasma, the process gas comprising a reactive gas.

5. The method according to claim 4, wherein the reactive gas comprises at least one of HBr and HCl.

6. The method according to claim 4, wherein the process gas further comprises an inert gas.

7. The method according to claim 6, wherein the inert gas is selected from He, Ne, Ar, Kr, Xe, or mixtures thereof.

8. The method according to claim 1, wherein the modifying comprises introducing a process gas into a plasma chamber and creating the plasma, the process gas comprising an inert gas.

9. The method according to claim 8, wherein the inert gas is selected from He, Ne, Ar, Kr, Xe, or mixtures thereof.

10. The method according to claim 1, wherein the high-permittivity material comprises at least one of Ta_2O_5, TiO_2, ZrO_2, Al_2O_3, HfSiO, and HfO_2.

11. The method according to claim 1, wherein the modifying further comprises RF powering a substrate holder that exposes the substrate containing the high-permittivity material to the plasma.

12. The method according to claim 1, wherein the modifying further comprises grounding a substrate holder that exposes the substrate containing the high-permittivity material to the plasma.

13. The method according to claim 1, wherein the modifying further comprises applying a DC bias to a substrate holder that exposes the substrate containing the high-permittivity material to the plasma.

14. The method according to claim 1, wherein the modifying further comprises electrically isolating a substrate holder from the plasma processing system, the substrate holder exposing the substrate containing the high-permittivity material to the plasma.

15. A method of processing a layer containing a high-permittivity material in a plasma processing system, the method comprising:

providing a layer containing a high-permittivity material overlying a substrate;

introducing a process gas into a plasma processing chamber and creating a plasma;

modifying the layer containing the high-permittivity material by exposing the layer to the plasma; and

removing the modified layer containing the high-permittivity material using wet etching.

16. A method of processing a layer containing a high-permittivity material in a plasma processing system, the method comprising:

providing a layer containing a high-permittivity material overlying a substrate;

introducing a process gas into a plasma processing chamber and creating a plasma;

anisotropically modifying the layer containing the high-permittivity material in accordance with a pattern by exposing the layer to the plasma; and

removing the layer containing a high-permittivity material using wet etching.

17. A plasma processing system comprising:

a process chamber capable of sustaining a plasma;

a gas injection system configured to inject a process gas into the process chamber;

a plasma source configured to create plasma from said process gas;

a substrate holder that exposes a substrate comprising a layer of high-permittivity materials to the plasma, thereby modifying the layer;

a controller that controls the plasma processing system; and

a wet cleaning chamber disposed in or operatively coupled to said process chamber.

18. The system according to claim 17, wherein the plasma source comprises an inductive coil.

19. The system according to claim 17, wherein the plasma source comprises a plate electrode.

20. The system according to claim 17, wherein the plasma source comprises an antenna.

21. The system according to claim 17, wherein the plasma source comprises an ECR source.

22. The system according to claim 17, wherein the plasma source comprises a Helicon wave source.

23. The system according to claim 17, wherein the plasma source comprises a surface wave source.

24. The system according to claim 17, wherein the process gas comprises a reactive gas.

25. The system according to claim 24, wherein the reactive gas comprises at least one of HBr and HCl.

26. The system according to claim 24, wherein the process gas further comprises an inert gas.

27. The system according to claim 26, wherein the inert gas is selected from He, Ne, Ar, Kr, Xe, or mixtures thereof.

28. The system according to claim 17, wherein the process gas comprises an inert gas.

29. The system according to claim 28, wherein the inert gas is selected from He, Ne, Ar, Kr, Xe, or mixtures thereof.

30. The system according to claim 17, wherein the high-permittivity material comprises at least one of Ta_2O_5, TiO_2, ZrO_2, Al_2O_3, HfSiO, and HfO_2.

31. The system according to claim 17, wherein said wet cleaning chamber is operatively coupled to said process chamber.

32. The system according to claim 17, wherein said wet cleaning chamber is disposed in said process chamber.

33. The system according to claim 17, wherein the substrate holder is RF powered.

34. The system according to claim 17, wherein the substrate holder is grounded.

35. The system according to claim 17, wherein a DC bias is applied to the substrate holder.

36. The system according to claim 17, wherein the substrate holder is electrically isolated from the plasma processing system.